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AN ECOLOGICALLY ANNOTATED LIST OF THE PHALAENIDAE OF MONTANA (LEPID.)*

BY WILLIAM C. COOK,

Bozeman, Montana.

(Continued from page 9)

Xylomoca Staud.

2615 *X. didonea* Sm. Scattered specimens from all parts of the State except the northern Plains region. August. Rare.

Namangana Staud.

2626 *N. praecuta* Sm. One specimen from Butte. Aug. 29, 1900, and one from Bozeman, Sept. 14, 1928.

Helotropha Led.

2636 *H. reniformis* Grt. One specimen from Havre, one from Bozeman, and two from Hamilton, August-September.

Apamea Ochs.

2639 *A. senilis* Sm. Quite common at Bozeman in certain seasons. One specimen from Three Forks, Aug. 19, 1925.

Gortyna Ochs.

2644 *G. serrata* Grt. One specimen from Bozeman, Aug. 24, 1908.

2646 *G. pallescens* Sm. Common in Intermountain and Pacific slope regions. July-September. Flights of this species, with *A. senilis*, often occur at Bozeman in September.

2647 *G. medialis* Sm. Intermountain and Pacific slope regions. September. Rare. This is probably a reddish form of the preceding species as we often have specimens which are intermediate in color.

2651 *G. perobliqua* Hamp. One specimen from Bozeman, Sept. 18, 1928.

Pyrrhia Hbn.

2655a *P. exprimens* Wlk. Five specimens from Hamilton, two from Bozeman and one from Miles City. June-August. McDunnough regards this as a distinct species from *P. umbra* Hufn.

Ipimorpha Hbn.

2724 *I. pleonectusa manitobae* Strand. Two specimens from Bozeman in August.

2726 *I. subvexa* Grt. Great Plains and Pacific slope regions. July-August. Rare.

Enargia Hbn.

2757 *E. decolor* Wlk. Pacific slope region. September-October. Fairly common. One specimen from Bozeman, Oct. 2, 1924.

Stiria Grt.

2759 *S. rugifrons* Grt. One specimen each from Malta, Miles City and Bozeman. June-August.

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Plagiomimicus Grt.

2769 *P. expallidus* Grt. Great Plains and Intermountain regions. July-August. Rare.

Arzama Wlk.

2784 *A. obliqua* Wlk. Three specimens from Bozeman and one from Malta. June-July.

Archanara Wlk.

2792 *A. subflava* Grt. Northern Plains region. August-September. Fairly common.

Calamia Hbn.

2800 *C. variana* Morr. Intermountain region. June-July. Rare. Two specimens from Hamilton.

Hypocoena Hamp.

2802 *H. rufostrigata* Pack. Great Plains and Intermountain regions. July. Rare.

Pseudacontia Sm.

2858 *P. crustaria* Morr. Four specimens from Miles City, June 15 to 29, 1929.

ERASTRIINAE

Lithacodia Hbn.

2900 *L. carneola* Guen. Great Plains. May-September. Common. This species was very abundant at Miles City in 1929, when over 500 specimens were captured. There must be two broods although it is impossible to separate them in this record.

Graeperia Grt.

2936 *G. sutrix* Grt. Three specimens from Miles City, July 5 to 17, 1929.

Conochares Sm.

2943 *C. acuta* Sm. Northern Plains and Intermountain regions. July-August. Rare.

Tarachidia Hamp.

2950 *T. tortricina* Zell. Scattered records from all parts of the State except the southern Plains. Fairly common in the northern Plains region. July-August.

2956 *T. candefacta* Hbn. Great Plains and Intermountain regiongs. July-August. Rare.

2959 *T. binocula* Grt. Northern Plains and Intermountain regions. July. Rare.

2965 *T. semiflava* Guen. Occurs everywhere except in the southern Plains region. Apparently quite common in the Pacific slope region. June-July. This species has been collected on flowers in canyons near Bozeman.

Conacontia Sm.

2969 *C. flavicosta* Sm. Statewide in distribution. Apparently most common in the Intermountain region. May-August. There are probably two broods. Two specimens from Montana, including the male co-type, are in the Smith collection.

2971 *C. angustipennis* Grt. Similar in distribution and seasonal history to the preceding species.

Tarache Hbn.

2978 *T. lanceolata* Grt. Occurs everywhere except in southern Plains region. Rare. July-August.

SARROTHRIPINAE

Sarrothripus Curtis.

3012 *S. revayana* Scop. Larvae of this species were found in the Bitter Root Valley in July 1912, on poplar. The original record states, "Caterpillar green, covered with scattered silky hair." The moths emerged the first week in August.

CATOCALINAE

Catocala Schrank.

The following records in this genus include only the specimens which have been picked up in the course of our regular collecting. We have never made any special attempt to collect Catocalas, either at bait or at flowers, so that it is probable that many of the species are much more abundant than our records indicate.

3053a *C. relicta clara* Beut. Three specimens from Hamilton, Oct. 8 and 9, 1928.

3055 *C. parta* Guen. One specimen from Bozeman, Aug. 31, 1929. was doubtfully referred to this species by McDunnough.

3056 *C. luciana* Stkr. One specimen from Malta, Aug. 17, 1928.

3057 *C. verecunda* Hlst. Great Plains and Intermountain regions. July-August. Rare.

3057a *C. verecunda diantha* Beut. Northern Plains and Intermountain regions. July-August. Apparently more rare than the typical form.

3062 *C. hermia* Hy Edw. Intermountain and Pacific slope regions. July-September. Rare.

3062,1 *C. orion* McD. This species, which was described from Lethbridge, Alberta, is probably fairly common in the northern Plains region. Seven specimens were secured at Malta in September 1928.

3063 *C. californica* Edw. Pacific slope region. September. Rare.

3065b *C. briseis minerva* Cass. One specimen collected at Bozeman, Aug. 31, 1926, was doubtfully referred to this form by McDunnough.

3070 *C. pura* Hlst. Scattered records from all parts of the State except the northern Plains region. August-October. This is probably our most common Catocala in Montana.

3080 *C. aspasia* Stkr. Three specimens from Bozeman in August.

Euclidimera Hamp.

3128 *E. annexa* Hy Edw. Three specimens from the Pacific slope region in May.

Euclidia Ochs.

3130 *E. cuspidea* Hbn. Statewide in distribution. May-June. Apparently rare everywhere. It is possible that this species is more abundant than our records indicate as our experience in Minnesota showed that this came much more freely to bait than to light.

Caenurgia Wlk.

3135 *C. erechtea* Cram. Statewide in distribution. May-August. Fairly common everywhere.

3136 *C. crassiuscula* Haw. Occurs with the preceding species, but is apparently less common.

3137 *C. distincta* Neum. We have a few specimens from localities near Bozeman in June and July. One larva of this species was brought in with cutworm feed in October 1925. It apparently would have hibernated as a larva under outdoor conditions, but it emerged in the insectary on Dec. 14. McDunnough thinks *distincta* may represent a spring form of *erechtea*.

Zale Hbn.

3178 Z. *galbanata* Morr. One specimen from Miles City, June 11, 1929. was doubtfully referred to this species by McDunnough.

3184a Z. *minerea norda* Sm. Three scattered specimens of this species from Hamilton, Malta and Miles City in May and June 1929.

PANTHEINAE

Panthea Hbn.

3208 *P. portlandia* Grt. Two specimens from Missoula, May 19, 1902.

3209 *P. virginaria* Grt. One specimen from Bozeman, July 26, 1928 and one from Hamilton, July 27, 1928.

PLUSIINAE

Syngrapha Hbn.

3223 *S. hochenwarthi* Hochen. Intermountain and Pacific slope regions. July-August. Rare.

Autographa Hbn.

3226 *A. orophila* Hamp. One specimen from Bozeman, June 20, 1929.

3228 *A. sackeni* Grt. One specimen from Bozeman, July 12, 1926.

3230a *A. falcifera simplex* Guen. Great Plains and Intermountain regions. June-August. Fairly common.

3235 *A. celsa* Hy Edw. One specimen from Hamilton, Aug. 8, 1928.

3236b. *A. rectangula nargenta* Ottol. Three specimens from Hamilton, July 30 to Aug. 8, 1928.

3237a *A. alias interalia* Ottol. Three specimens from Hamilton in July and August.

3245 *A. v-alba* Ottol. Three specimens from Bozeman in August.

3249 *A. brassicae* Riley. Statewide in distribution. Apparently not common anywhere. July-August.

3255 *A. putnami* Grt. Intermountain and Pacific slope regions. June-July. Rare.

3259 *A. biloba* Steph. One specimen from Miles City, July 22, 1929.

3266 *A. pseudogamma* Grt. Intermountain and Pacific slope regions. July-August. Fairly common at Bozeman in certain seasons.

3267 *A. californica* Speyer. Statewide in distribution. Most common in Intermountain and Pacific slope regions. This is the "alfalfa looper," of which one or two outbreaks have been recorded in the State. Moths have been recorded from April to September. This species probably winters as pupa or adult. In view of the fact that the heaviest flight comes in May and June it seems possible that the life history may be similar to that of *Barathra configurata*.

3269 *A. ou* Guen. One specimen from Missoula, May 10, 1902.

3271 *A. sansoni* Dod. One specimen from Bozeman, July 11, 1929.

3272 *A. metallica* Grt. Common in Pacific slope region. A few scattered specimens from Bozeman. July-September.

3274 *A. ampla* Wlk. Intermountain and Pacific slope regions. July-August. Rare.

Plusia Ochs.

3275 *P. acreoides* Grt. Recorded everywhere except in the southern Plains region. July-August. Rare.

Chrysoptera Latr.

3279 *C. morigera* Hy Edw. One specimen captured at Bozeman July 30, 1929, was doubtfully referred to this species by McDunnough.

Palaeoplusia Hamp.

3284 *P. venusta* Wlk. Four specimens from Hamilton, Bozeman and Malta, in July and August.

Abrostola Ochs.

3287 *A. urentis* Guen. One specimen collected in the Bridger mountains near Bozeman, July 19, 1925, at 5500 ft. altitude.

EREBINAE

Raphia Hbn.

3290 *R. coloradensis* Put. Statewide in distribution, more common in the Pacific slope region. June-August.

Melipotis Hbn.

3310 *M. pallescens* G. & R. One specimen from Malta, June 29, 1929.

3313 *M. versabilis* Harv. Great Plains region. May-August. Rare.

Syneda Guen.

The species of this genus are quite largely day-flying and may be captured in rather hot dry places in mountain canyons. The light trap records do not give a true idea of their abundance. Some attempt has been made to collect them in the Intermountain region, but the records for the Plains species were all obtained from light traps.

3330 *S. adumbrata* Behr. Intermountain and Pacific slope regions. May-July. Common.

3331 *S. petricola* Wlk. Four specimens of this species have been collected near Bozeman in May. Three of them came from a very interesting dry canyon country in the Horse-shoe Hills, about twenty-five miles north of Bozeman.

3332 *S. perplexa* Hy Edw. One specimen from Malta, July 5, 1928.

3333 *S. alleni* Grt. Three specimens from the mountains near Bozeman, in June.

3337 *S. hudsonica* G. & R. Intermountain and Pacific slope regions. June. This species is fairly common in the canyons around Bozeman.

3342 *S. howlandi* Grt. One specimen captured in a light trap at Three Forks, July 12, 1929.

3345.1 *S. heathi* B & McD. Great Plains region. May-August. This species is apparently fairly common as we have quite a few light trap records.

Toxocampa Guen.

3348 *T. victoria* Grt. One specimen from Missoula. May 10, 1902.

Erebus Latr.

3391 *E. odora* Linn. We have records of two captures of this central American species in Montana. The last was a specimen sent in from Winifred in central Montana, in April 1926.

Scoliopteryx Germ.

3399 *S. libatrix* Linn. Intermountain and Pacific slope regions. May-October. Rare. We have one record of a larva picked up on poplar in western Montana in July 1912. The larva pupated July 9, and the moth emerged August 3.

HYPENINAE

Reabotis Sm.

3413 *R. immaculalis* Hlst. Northern Plains, Intermountain and Pacific slope regions. July-August. Rare. The type of this species in the New Jersey collection bears the label "Montana, Hayden Expedition, 1872".

Pleonectyptera Grt.

3452 *P. finitima* Sm. One specimen from Miles City, July 3, 1929.

Epizeuxis Hbn.

3485 *E. americalis* Guen. Statewide in distribution. Quite common in Pacific slope region. June-August.

3486 *E. aemula* Hbn. Four specimens from Miles City, July 6 to 8, 1929.

3496 *E. lubricalis* Geyer. One specimen from Three Forks, Aug. 8, 1927, collected on rabbit brush.

Chytolita Grt.

3519 *C. morbidalis* Guen. About 12 specimens of this species were reared from larvae picked up among the dead leaves in a cottonwood area near Bozeman in April 1924. *Septis plutonia* and *Polia lustralis* were also reared from this collection.

Bleptina Guen.

3536 *B. caradrinalis* Guen. Great Plains region. June-July. Rare.

Hypena Schrank

3579 *H. humuli* Harr. Statewide in distribution. Quite common in Intermountain and Pacific slope regions. May-July.

THE BICOLOR GROUP OF THE GENUS EPHEMERELLA WITH PARTICULAR REFERENCE TO THE NYMPHAL STAGES* (EPHEMEROPTERA)

BY J. MCDUNNOUGH

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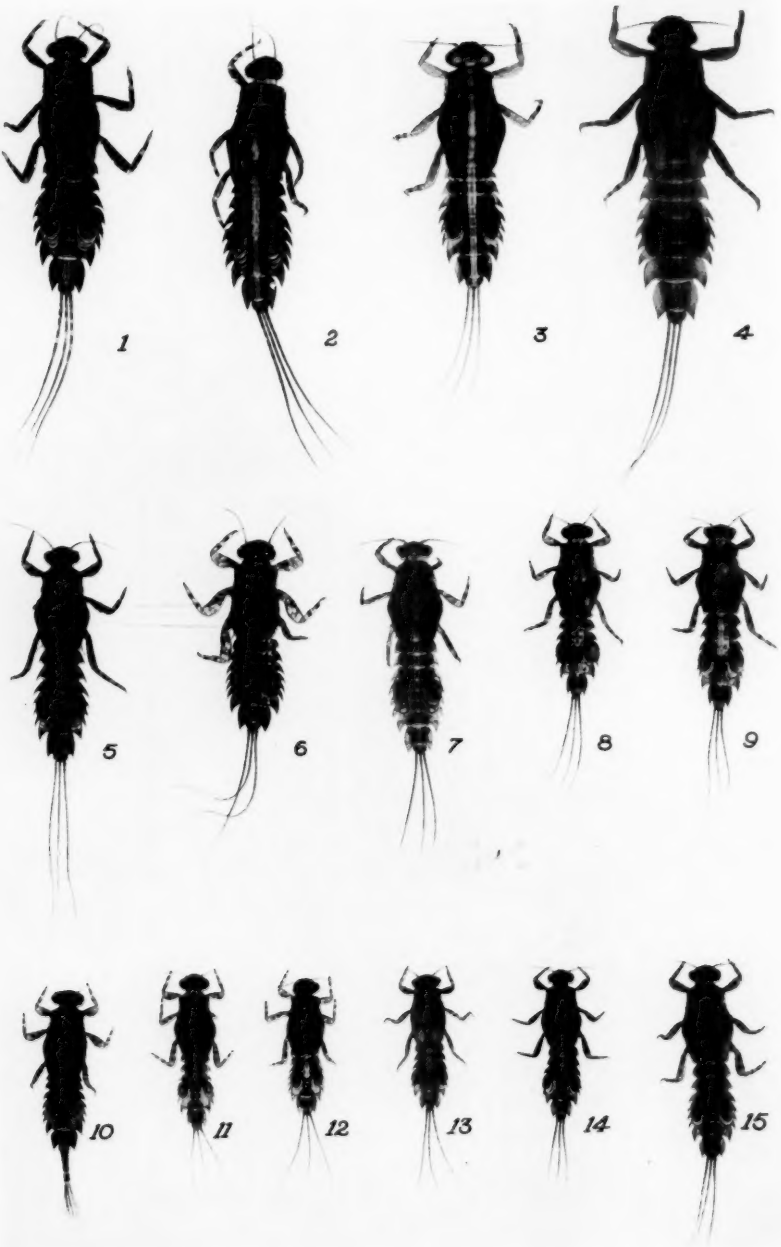
During the course of breeding experiments in Ephemeroptera which we have been carrying on during the past few years, considerable nymphal and associated adult material of the genus *Ephemerella* has been accumulated. The main source of these collections has been the district around Knowlton, Que. where the diversified nature of the country has been particularly favorable for our studies; in addition material is also at hand from the Lachine-Vaudreuil section of the St. Lawrence Valley and from the Gatineau region in the vicinity of Wakefield, Que.

An attempt is made in the present paper to elucidate one of the most interesting and at the same time most difficult sections of the genus *Ephemerella*. The species comprising this section form a very compact little group, characterized in the nymph by the fact that there are no gills on the third abdominal segment and that the gill of the fourth segment forms a species of

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.



EPHEMERELLA NYMPHS

operculum which almost completely covers the gills found on segments 5-7. The lateral edges of the abdominal segments are flattened to a greater or less degree and drawn out into spines which increase in length from the second to the eighth segments. All of the species show two rows of dorsal abdominal tubercles or spines and most of them bear a pair of occipital tubercles as well; the fore femora, while somewhat thicker than those of the two hinder pairs of legs are not nearly so robust as in the *cornuta* group nor are they tuberculate or toothed along the anterior margin; the maxillary palp is lacking throughout the group. The color pattern appears to be very variable within each species and there may possibly be a certain amount of sex dimorphism; it is certain that the presence or absence of a distinct pale median stripe such as is mentioned and figured by Clemens (1913, Can. Ent., XLV, 336, Pl. V, fig. 11) cannot be used as a specific character; our breeding experiments have shown that it is merely an individual color phase which will probably be found to occur in most of the species of this group. Apart from considerable differences in size all the nymphs bear a close resemblance to each other and it is only by noting such features as general shape, the presence or absence of occipital tubercles, the length and position of the dorsal abdominal tubercles, the postero-lateral prolongations of the abdominal segments, and even the maculation of the legs or the banding of the setae that one can differentiate the various species; as these characters are mostly relative it is difficult to incorporate them satisfactorily into a key but it is hoped that the illustrations presented will help to elucidate at least some of the above-mentioned points.

The adults show the same close relationship as is found in the nymphs; the color of the males is a brown of varying shades but generally with a decided ruddy tinge, the females being paler and tending towards yellow or ochreous. The legs are normal in length and generally quite bright yellow; there is frequently a black spot on the coxa and sometimes on the trochanter as well; the setae (except in *coxalis* McD.) are distinctly banded with brown. In the male genitalia the forceps show no apical enlargement of the second joint but there is a distinct tubercle midway between their bases; the penes are closely united, broad and often swollen in the basal half, bent gently upward and tapering apically, with only a slight excision at the apex; the subanal plate of the female is rather flat, spade-shaped, with slight terminal excavation. In separating the adults the finer details of the male genitalia may in certain cases be used to advantage and there seem also to be some differences in the female subanal plate although I have not investigated this very closely; other characters may be found in the size, color and maculation but in some instances all characters seem to break down and it is only by definite nymphal association that the identity can be fixed.

As far as is known at present the species are all eastern in their distribution; *frisoni* McD. from Illinois, which at the time of description I associated with this group, I believe now should fall near *sordida* and *serrata,* as the setae are unbanded and the penes show under careful examination the same type of barb-like process near the apex. The nymphs figured by Needham (1905, Bull. 86, N. Y. Sta. Mus., Pl. IX, fig. 1) from Elkhart, Ind. and erroneously indentified as *excrucians* certainly belong in the group and may be those of *coxalis* McD.; as far as can be judged, these figures fit in very closely

with an unassociated nymph before me from the Rideau River which I incline to think is that of *coxalis*, the only member of the group not yet bred.

The group is very nicely linked up with other sections of the genus by the species *attenuata* McD. and *simplex* McD., the nymphs of which agree in their generally flattened shape and in possessing gills on segments IV-VII only; in these two species there is, however, no operculum, the gills merely overlapping as in the *invaria* group; *simplex*, furthermore, is without dorsal tubercles.

KEY TO NYMPHS

1. Width between dorsal tubercles on abdominal tergites V-VII much less than the length of the respective tergite in the median line; large species 2
   Width between dorsal tubercles on abdominal tergites V-VII more or less equal to the length of the respective tergite in the median line 3
2. The two rows of dorsal tubercles converging posteriorly; occipital tubercles moderately developed ..... *prudentalis* n. sp.
   The two rows of dorsal tubercles subparallel; occipital tubercles strongly developed ..... *temporalis* McD.
3. Postero-lateral prolongations of segments II and III well-developed, that of III being fully twice as long as broad at the base 4
   Postero-lateral prolongations of segments II and III weak, that of III being never more than equal in length to its width at base 6
4. Lateral margins of segment IX subparallel with terminal spine incurved ..... *funeralis* McD.
   Lateral margins of segment IX distinctly convex with straight terminal spine 5
5. Shape elongate; dorsal tubercles on anterior segments long, finger-like, tapering; size 10-12 mm. ..... *lutulenta* Clem.
   Shape broader and chunkier; dorsal tubercles on anterior segments broad and blunt; size 8-9 mm. ..... ? *coxalis* McD.
6. Lateral prolongations of segments II and III very weak, that of II being practically lacking; occipital tubercles lacking in ♂, much reduced in ♀ 7
   Lateral prolongations of segments II and III stronger, II showing a short spine; occipital tubercles present in both sexes and moderately strong 8
7. Dorsal tubercles long, thin, erect and little reduced on gill-bearing segments; the two rows evenly divergent posteriorly ..... *minimella* n. sp.
   Dorsal tubercles short, thick, considerably flattened and reduced on the gill-bearing segments; the two rows rather abruptly divergent on segment V ..... *bicolor* Clem.
8. Hind femora short, broad; two rows of dorsal tubercles subparallel ..... *aestiva* n. sp.
   Hind femora longer and narrower; two rows of dorsal tubercles divergent posteriorly ..... *verisimilis* McD.

Ephemerella lutulenta Clem.

Pl. 2, figs. 3, 4; Pl. 3, fig. 1; Pl. 4, fig. 1; Pl. 5, figs. 7, 8.

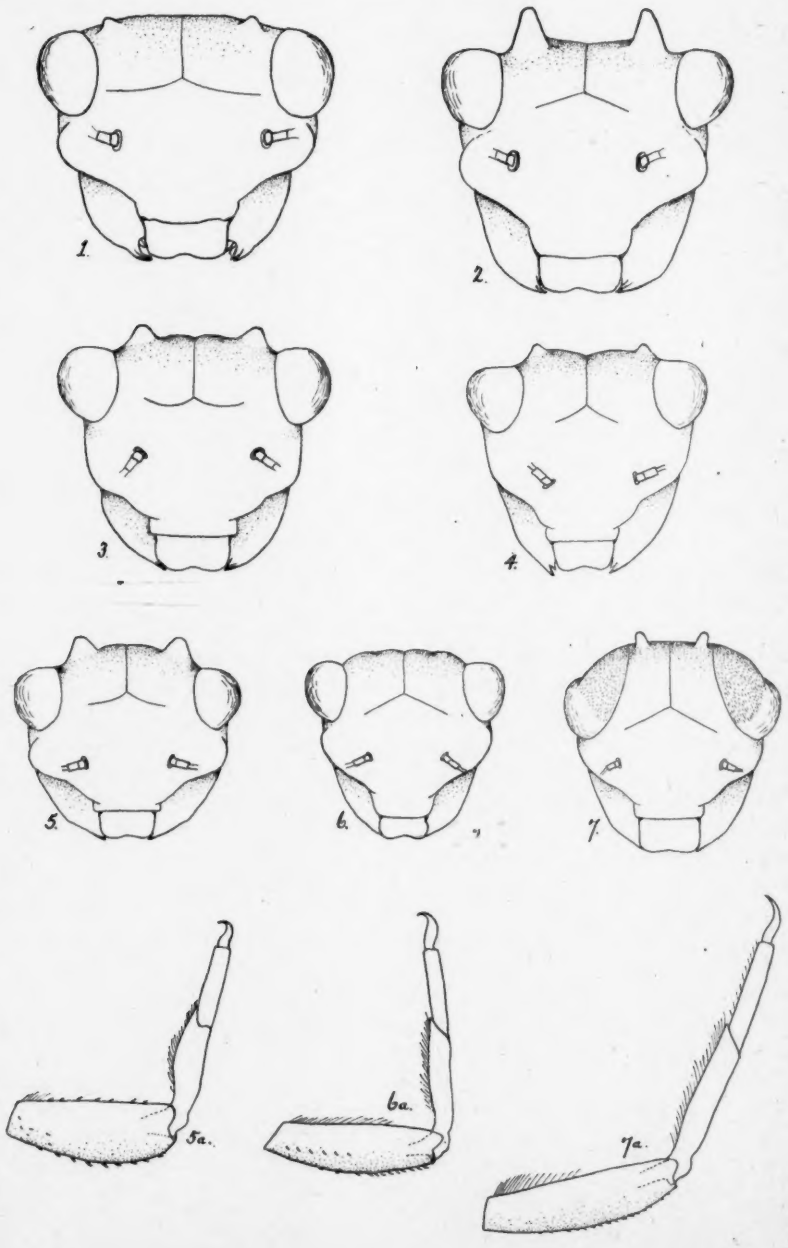
Ephemerella lutulenta Clemens, 1913, Can. Ent. XLV, 335; *id.*, 1915, Cont. Can. Biol. 121 (*partim*): McDunnough, 1924, Occ. Papers Bost Soc. N. Hist. V, 74; *id.*, 1925, Trans. Roy. Soc. Can. (3), XIX, Sec. V, 212.

Ephemerella lineata Clemens, 1913, Can. Ent. XLV, 336; *id*, 1915, Cont. Can. Biol. 122 (*partim*); McDunnough, 1924, Occ. Papers Bost. Soc. N. Hist. V, 74.

From a comparison of the Holotype ♀ of *lineata* and the Allotype ♀ of *lutulenta,* both in rather poor condition, I have long suspected the above synonymy; study of the actual nymphal skins from which the type material of both species was bred and which have recently been generously donated to the National Collection by Dr. Clemens, confirms my suspicion. Further, an examination of the extensive unbred nymphal material on which Clemens in part based his description shows conclusively that he had confused the nymphs of the species I later described as *temporalis* along with those of *lutulenta* and *lineata.* Using erroneously the presence of a pale medio-dorsal stripe as a specific character he had placed under *lutulenta* all more or less unicolorous nymphs of both *lutulenta* and *temporalis* whilst the striped forms of both species were placed together as *lineata*; this would account for the statement under *lineata* that the occipital tubercles are slightly longer than those of *lutulenta,* a statement which applies to *temporalis* but not to *lineata.* Fortunately the bred type specimens, as far as they are before me, are all conspecific and bear out the above synonymy.

The species is one of the largest of the group and is at once distinguished in the adult by the presence of minute black dots sprinkled over the legs, thoracic venter and abdomen; the subimago has the wings of a mottled appearance, rather similar superficially to those of *Ecdyonurus,* and is therefore easily distinguished from the unicolorous black subimagos of the other species of the group. The male genitalia are very similar to those of *temporalis*; my statement (1924, *op. cit.* 74) that the tubercle between the forceps-bases is lacking is incorrect and due to the fact that only the rather defective types were available at the time for comparison; more and better preserved material shows that this characteristic tubercle is present, although somewhat reduced.

The nymph, as far as present information goes, is an inhabitant of lakes or broad lake-like expansions of rivers; it matures early in June and is one of the earliest species of the group to appear in the adult state. It is of large size (♂, 9-10 mm.; ♀, 11-12 mm.) and the occipital tubercles are so reduced in the male sex as to be almost obsolete; in the females they are better developed and consist of distinct rounded prominences, much smaller, however, than the erect conical tubercles found in both sexes of *temporalis.* The two rows of dorsal abdominal spines or tubercles diverge slightly but distinctly from front to rear, those of segment II being about twice as wide apart as each tubercle is long, whilst on segments V-VII the distance between the tubercles is about equal to the length of their respective tergites in the median line. On segments I-III the tubercles are long erect, bluntly finger-shaped and bent backward whilst on IV-VII they are shorter, flatter and more acuminate, forming the termination of slightly oblique ridges which originate in the mid-section of the segment; on segments VIII and IX they are obsolete. The postero-lateral spine-like prolongations of the abdominal segments II-VIII are strongly developed; segment II shows a distinct, but short, spine; on III the spine is well-developed and fully twice as long as it is broad at the base; the remaining segments, as a reference to the figures will show, possess very long spines, curving regularly backward, and clothed along the lateral edge with mixed hair and spinules. Segment VIII is slightly over three times as broad as long (♂, 15: 42-45: ♀, 15: 47-50). The gill-cover or operculum of the fourth segment is without much maculation except a varying number of fine pale dots but is generally very distinctly longi-



BICOLOR GROUP OF EPHEMERELLA

tudinally veined. In mature nymphs the ventral abdominal surface shows frequently a subintegumental sprinkling of fine black dots as in the imago but the curved row of four black dots on the anterior portion of each segment is very obscure and is generally only faintly represented by the two median dots; there are indications of the lateral rows of short longitudinal dashes. The setae are more or less unicolorous brown and not nearly so contrastingly banded with alternate bands of brown and pale yellow as are those of *temporalis;* this character, however may not always hold and should be used with caution.

MATERIAL EXAMINED. *Adults*:- Clemens' type series from Georgian Bay Region, Ont.; 6 ♂, 2 ♀, Orillia, Ont.; 2 ♂, 1 ♀, Ottawa, Ont.; 2 ♂, 7 ♀, Gauvreau Lake, near Wakefield, Que.; 5 ♂, Lachine, Que.; 2 ♂, Laprairie, Que.; 1 ♀, Chateauguay, Que.; 2 ♂, 7 ♀, Fredericton, N. B. *Nymphs*:- Clemens' collections from Georgian Bay Region; two specimens, Lake Simcoe, Ont.; two nymphal skins, Gauvreau Lake, Que.; 1 specimen, Mahon Lake, near Wakefield, Que.

Ephemerella temporalis McD.

P. 2, figs. 1, 2.; Pl. 3, fig. 2; Pl. 5, fig. 9.

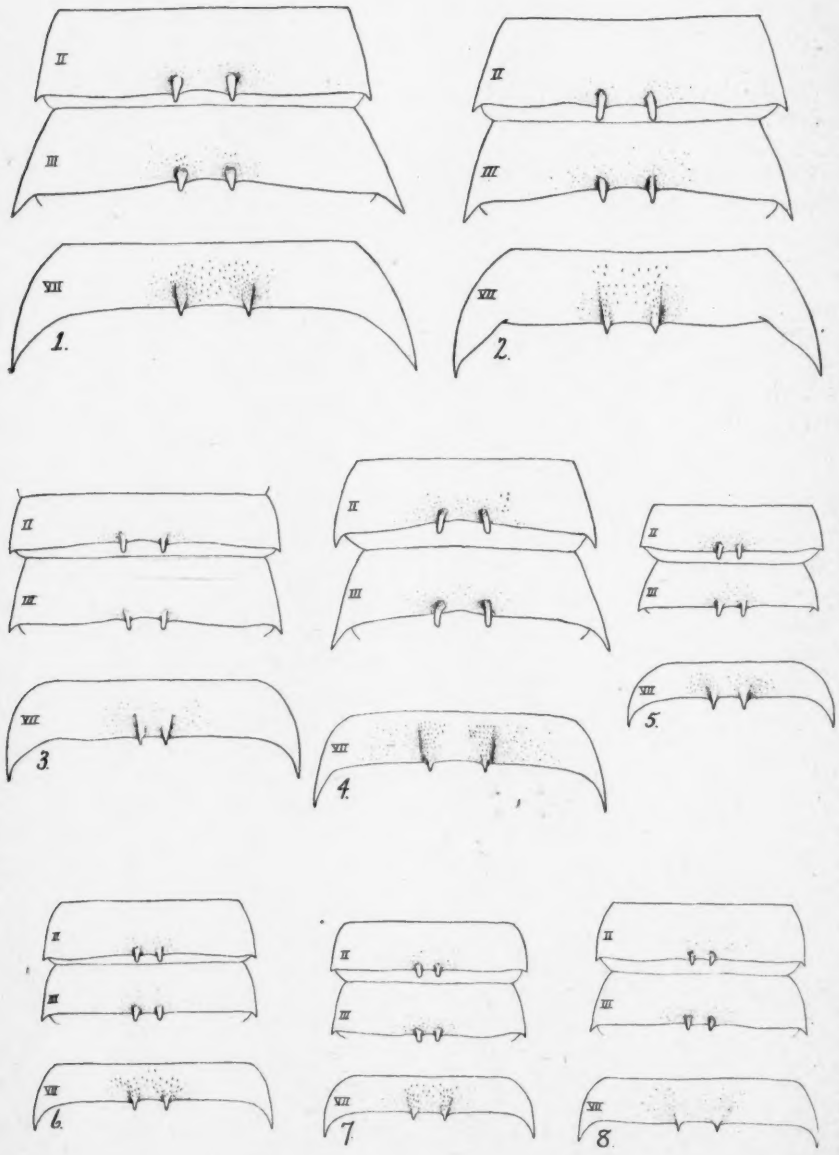
Ephemerella temporalis McDunnough, 1924, Occ. Papers Bost. Soc. N. Hist. V, 74, Pl. VI, fig. 2; 1925, *id.*, Trans. Roy. Soc. Can. (3) XIX, Sec. V, 212; 1930, *id.*, Can. Ent. LXII, 58, Pl. VII, fig. 3.

A large species, easily separated in the adult state from *lutulenta* by the entire lack of black sprinkling on legs and abdomen, the brighter shades of brown coloration on thorax and abdomen and the presence of four black dots, arranged in a curved row across the anterior portion of the ventral abdominal segments.

The wings of the subimago are an even dull blackish, neither mottled as in *lutulenta* nor intense black as in *funeralis* and *bicolor*. Other adult characters have been dealt with in the above-cited articles but it might be well to mention that the Covey Hill record for the species, based on two females (1925, *op. cit.* 212), is probably incorrect and should be referred to a species I am describing later on as new. The species appears a week or two later than *lutulenta*.

The nymph, heretofore undescribed, is closely allied to that of *lutulenta* and, like it, is a frequenter of large bodies of open water. The two species often occur together but *temporalis* generally matures a week or so later than *lutulenta*. When mature it is normally of a deep brown color, heavily sprinkled, both dorsally and ventrally, with small pale dots; this ground-color is, however, decidedly variable and I have examined nymphs from the Lachine region which are a dull clay-color without any very decided dark maculation; as in *lutulenta* some specimens show a distinct, pale, broad, dorsal stripe (*vide* fig. 2), bordered by shades somewhat darker than the body-color; these darker stripes often persist in specimens which lack the pale median stripe. The size is large, much as in *lutulenta* (9-11 mm.). The occipital tubercles are very strongly developed in both sexes and are conical in shape. The two rows of dorsal abdominal tubercles are subparallel, diverging slightly at times on segment IV; the distance between the tubercles on segment II is from one and a half times to twice the length of each tubercle whilst on segments V-VII this distance is decidedly less than the length of the tergite in the median line. On segments I-III the tubercles are longer than in *lutulenta* and rather more tapering apically, being, however, finger-shaped and bent backward as in this

CAN. ENT. VOL. LXIII PLATE 4.



BICOLOR GROUP OF EPHEMERELLA

species; on the other segments they do not differ noticeably from those of *lutulenta* except that the rows are closer together. The lateral prolongations of the abdominal segments are very similar to those of the preceding species, the spine of segment III being normally slightly shorter than in *lutulenta*. The width of segment VIII is almost four times its median length (11: 40-43). The operculum is heavily sprinkled with pale dots and frequently shows two pale patches along the joint; the longitudinal veining is generally indistinct. On the ventral surface, which is heavily sprinkled with pale dots, the curved row of four black spots on the anterior portion of each of segments I-VII (and at times VIII) is very distinct and there is besides a lateral row of short black dashes. The setae are distinctly banded with alternate bands of brown and pale yellowish.

MATERIAL EXAMINED. *Adults*:- Type specimens and long series from the Ottawa, Lachine and Knowlton, Que. regions, including bred material from Gauvreau and Mahon Lakes, near Wakefield, Que., Lachine, Vaudreuil and Brome Lake, Knowlton; further 1 ♂, Minaki, Ont. (the most westerly record), a small series from Orillia, Ont. and vicinity and specimens from Fredericton, N. B. *Nymphs*:-Specimens from Georgian Bay region, Ont. (Clemens), Gauvreau and Mahon Lakes, near Wakefield, Que., Lachine, Vaudreuil and Brome Lake, Knowlton, Que. with the cast nymphal skins of the bred specimens mentioned above.

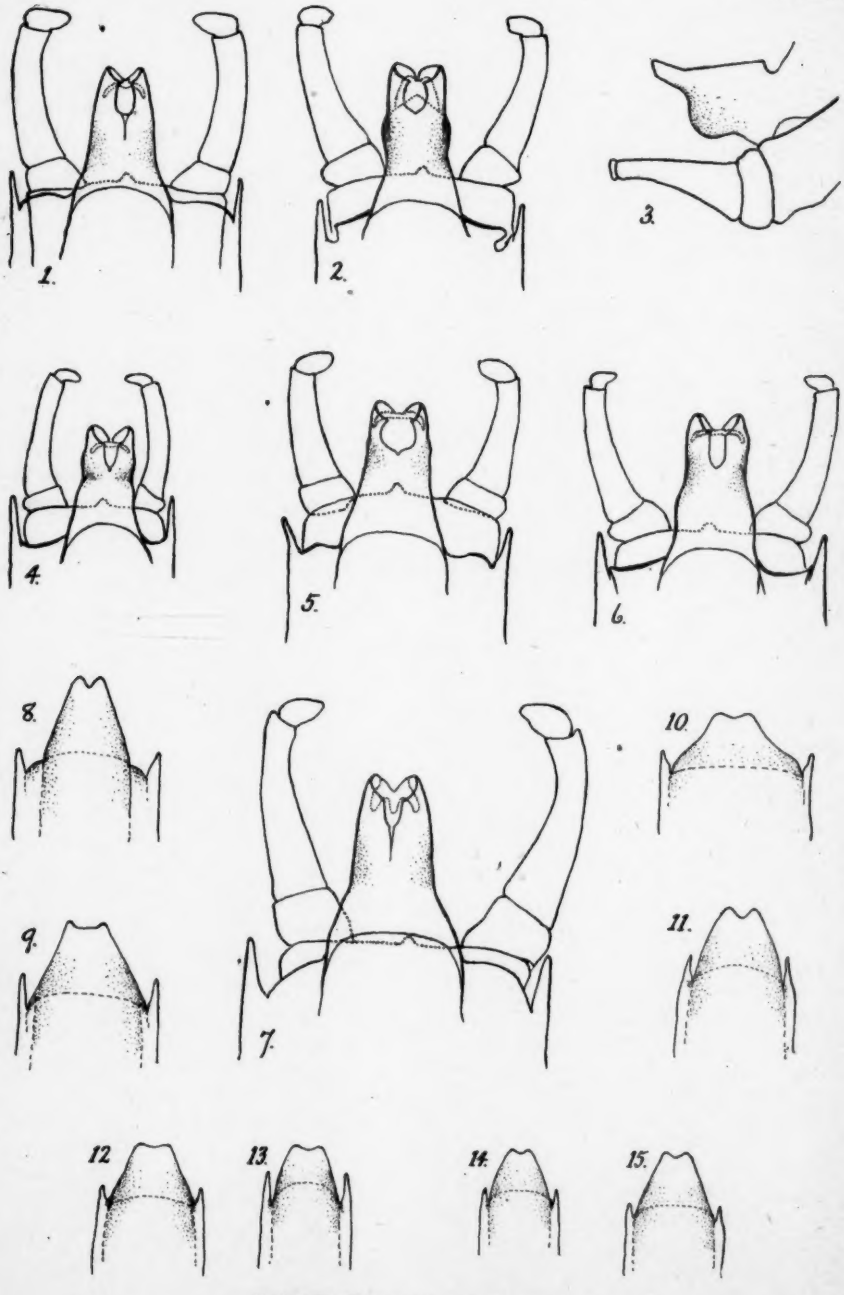
Ephemerella coxalis McD.

Pl. 2, fig. 6; Pl. 5, figs. 1, 11.

Ephemerella coxalis McDunnough, 1926, Can. Ent. LVIII, 186.

Beyond figuring the male genitalia and female subanal plate I have little to add to what was said in the original description. The only other specimens before me besides the type series are 1 ♂, from Kearney, Ont. (1926) and 1 ♀, from Brome Lake, Que. (1928).

The nymph has not yet been definitely associated but I am inclined for the present to place a single nymph (fig 6) taken in 1928 in the Rideau River at Ottawa under this name; a similar nymph was taken in 1930 in the same river but attempts to breed it were unsuccessful. It is much paler in color than the other nymphs of the group, the head and thorax being heavily sprinkled with pale dots which gives them a general gray-brown appearance; the abdomen is light brown, strongly suffused laterally with pale yellowish and black and with traces of black sub-dorsal lines in the region of the tubercles; the antennae, head tubercles and dorsal tubercles are prominently whitish; the legs are pale yellowish and the usual banding, which is light brown in color is considerably reduced by pale spotting. The length of the body is over 8 mm. (the specimen before me is not quite fully grown) and the shape is broader and less elongate than usual. The occipital tubercles are not very prominent, being much as in *funeralis;* the two rows of dorsal abdominal tubercles, already well-separated on the anterior segments, diverge towards the rear until on segment VII the individual tubercles are as wide apart as the tergite is long in the median line; the tubercles of segments I-III are broad, rather short and blunt, and bent gently backward, those of segment II being about twice as wide apart as the individual tubercle is long. The lateral prolongations of segments II and III are slightly longer than in *temporalis,* those of the gill-bearing segments being much



BICOLOR GROUP OF EPHEMERELLA

longer and narrower and more incurved than in either this species or *lutulenta*. The greatest width of segment VIII is to its length in the median line as 35:9. The operculum is broadly oval, shows faint dark longitudinal veining and has the joint marked by a pale line as well as a narrow, oval pale median patch. Ventrally the abdomen is largely pale, due to the partial fusing of the pale sprinkling of dots; the curved row of four black dots is present. The setae are light brown with the merest traces of pale banding.

It seems quite probable that it is this nymph which Needham erroneously figures (1905, Bull. 86, N. Y. Sta. Mus. Pl. IX, fig. 1) as that of *excrucians* Walsh, a species which I have already shown as belonging in an entirely different section of the genus.

Ephemerella funeralis McD.

Pl. 2, fig. 5; Pl. 3, fig. 3; Pl. 4, fig. 4; Pl. 5, fig. 10

Ephemerella funeralis McDunnough, 1925, Trans. Roy. Soc. Can. (3) XIX, Sec. V, 210.

In contradistinction to *lutulenta* and *temporalis* the present species occurs in the vicinity of small mountain streams, where the nymph may be found in the quieter stretches of water; the main flight occurs in the latter half of June but odd specimens still appear in early July. In the vicinity of Knowlton *funcralis* is quite common and the large, very black-winged subimago can frequently be beaten from trees bordering the numerous brooks of this region. The nymph was first bred by Messrs. Walley and Milne in 1930 although the association had been suspected from similar nymphs secured the previous year; it is a noteworthy fact that in the long series of nymphs collected not a single male nymph has been found and it would therefore appear as if the species were confined to the female sex as is the case with *Ephemerella rotunda* Morg. The doubtful male Allotype should probably be referred to *verisimilis;* in any case until actual male nymphs have been bred or the sexes taken *in coitu* it would seem wiser to consider the male as nonexistant.

A useful character in separating this species from allied forms, apart from its dark color, is found in the practically entire lack of the curved row of black dots on the ventral sternites, these dots being quite prominent in the following species with which it might otherwise be confused. The oval depression in the pronotum which I stressed in the original description is not as good a character as I imagined at the time as it is present to a greater or less degree in both *temporalis* and the following new species; it is, however, useful in separating the species from *verisimilis* in which the depression is obsolescent. As already noted the subimago has very unicolorous, deep black wings with rather bright yellow legs; there is a fairly prominent dark spot at the apex of the femora.

The nymph is rather unicolorous brown and does not seem subject to as much color-variation as is shown in the preceding species; the maculation of the femora is very indistinct and while the pattern is essentially the same as that found in *temporalis* the contrasting shades of black-brown and pale yellow usual in well-colored specimens of this latter species is entirely lacking. The normal nymph, when mature, is quite large, averaging between 8.5 and 9.5 mm., but it was noticed that in the same stream a smaller race or strain would often occur which in a full-grown state would hardly exceed 7 mm.; adults bred from these smaller nymphs exhibited no differences, other than that of size, from

the larger form. The head shows well-developed, rounded, occipital tubercles, about half the size of those of *temporalis*. The two rows of dorsal abdominal tubercles are distinctly divergent from the first to the seventh segments, the distance between the individual tubercles on segments V-VII being fully as great as the length of the respective tergites in the median line; in this feature *funeralis* agrees with *lutulenta* and differs from *temporalis*. The tubercles of segments I-III are very erect, thin and taper to a blunt point; they are longer than in either of the preceding species, being usually about two-thirds as long as the distance between the tubercles of segment II; as usual the tubercles of IV-VII are flatter, shorter and more spine-like. The lateral prolongations of segments II-VIII reach their maximum development in this species, those of II and III being very strong whilst on the following segments they are drawn out and acuminate; the lateral edges of segment IX are subparallel, each edge terminating in a distinctly incurved spine, a feature that is one of the best means of distinguishing *funeralis* from the other members of the group in which the sides of this segment are decidedly convex and the apical spine is not incurved. The greatest width of segment VIII as compared to its median length is as 32:10. The operculum of the fourth segment either shows no maculation or is very indistinctly sprinkled with paler dots; the hinge-line is not indicated in pale color. Ventrally the curved row of four dark dots is obsolete as in the imago, but traces of the lateral rows of dashes are visible under the integument. The setae are unicolorous brown with the segmental divisions of a few of the basal segments narrowly margined with deeper brown.

MATERIAL EXAMINED. *Adults*:- Type series and other specimens from Covey Hill, Que.; 4 ♀ from Kearney and Sand Lake, Algonquin Park, Ont.; long series of females from the Knowlton, Que. region including bred specimens; 4 ♀, 2 subimagos from Thunder River, Que. on the north shore of the Gulf of St. Lawrence, with one bred specimen. *Nymphs*:- Good series from both the Knowlton and Thunder River regions, and a few from Covey Hill, Que.

Ephemerella prudentalis n. sp.

Pl. 2, fig. 7; Pl. 3, fig. 4; Pl. 4, fig. 3; Pl. 5, figs. 2, 3, 12.

Male. Scarcely separable from *E. temporalis* McD. except on characters of genitalia, the color of the abdominal tergites being perhaps slightly darker in dried specimens and the average size somewhat smaller. As in *temporalis* and in contradistinction to *funeralis* the black spots on the pale ventral surface of the abdomen are very distinct; there is also a distinct black spot subdorsally on each coxa. In the genitalia the penes show a ventral globular swelling about midway from base to apex at the point where they bend rather sharply upward; this swelling is best seen from a lateral view and in dried specimens has a tendency to collapse and form a depression.

Female. Somewhat darker than *temporalis* females, the head being a deep, rather than a pale, yellow with the usual darker shadings; the rear segments of the abdomen dorsally tend to pale brown rather than to ochreous and ventrally there is considerable brownish suffusion; the subanal plate is somewhat shorter than in *temporalis* but noticeably longer and narrower than in *funeralis*. Length of body 8 mm.; of wings 8 mm.

Holotype—♂, Knowlton, Que., June 25, 1929, (L. J. Milne); No. 3190 in the Canadian National Collection, Ottawa.

Allotype—♀, Knowlton, Que., June 24, 1929, (L. J. Milne).

Paratypes—28 ♂, 15 ♀, taken in the vicinity of Knowlton, June 22-26, 1929 by Messrs. Walley, Milne and McDunnough, certain ones of these captured *in coitu*.

The species was very common in 1929 swarming at dusk in the vicinity of the small mountain streams south of Knowlton on the Bolton Pass road; it was also secured at Fulford, Que. June 22, and at Waterloo, Que. June 27. There are further a few specimens in our collection from Kearney, Ont. taken by F. P. Ide. A single male from Covey Hill, Que. is before me (June 18, 1927, Walley) and it is quite probable that at least one of the females doubtfully recorded by me as *temporalis* (1925, Trans. Roy. Soc. Can. XIX, Sec. 5, 212) belongs here.

We were too late to obtain nymphs of the species at Knowlton in 1929 but fully expected to do so in 1930 when collecting was started two weeks earlier, however, the species was already swarming by June 8 and it was only by chance that a single late nymph was secured in Knowlton Creek and bred through to a ♂ imago on July 1; two other similar nymphs were found among material collected from the Mid-Yamaska River at Foster, Que. on June 11, and three more from Brome Lake collections on June 18. In the Gatineau region a single nymph was secured in 1930 from the Lapeche River at Wakefield, Que. and a number were taken in Gauvreau Lake, four miles distant, early in June; from one of these latter a female imago was bred. I also have examined a single nymph from Kazubazua, Que.

The nymph is about the size of *funeralis* (8-9 mm.) and resembles in color of abdomen and legs a dark *temporalis;* occasional specimens with the pale dorsal stripe are met with. The occipital tubercles are present in both sexes but only moderately developed, being hardly more than rounded excrescences. The tubercles comprising the two dorsal rows on the abdominal segments I-VIII are widest apart on the anterior segments and converge distinctly towards segment VII where the width between them is scarcely one-half the median length of the tergite. Those of segments I-III are finger-like and bluntly tapering but shorter, flatter and less curved than in any of the preceding species, the distance between the two on segment II being greater than twice the length of a tubercle; the tubercles of segments IV-VII do not differ so decidedly from those of the anterior segments as was the case with the preceding three species, being merely slightly shorter and flatter and rather more acuminate. The lateral prolongation of segment II is short, but still forms a distinct spine, that of III is longer, the spine being, however, much shorter than in *funeralis;* the other prolongations are much as usual. The greatest width of segment VIII as compared to its median length is as 32:9. The operculum is well sprinkled with pale dots and the hinge-line is defined by pale; there is also a small, oval, pale patch in the centre of the anterior portion. Ventrally, as in the imago, the curved row of four dots and the lateral longitudinal dashes are present on segments I-VII. The setae are not noticeably banded but the segmental incisions are defined by a darker ring.

From *lutulenta* and *funeralis* the nymph is easily separable through the much closer proximity of the dorsal tubercles on V-VII; *temporalis* differs in the stronger occipital tubercles and the longer and more approximate dorsal tubercles on I-III.

(to be continued)

REVISION OF THE NORTH AMERICAN AEGIALIINAE* (COLEOPTERA)

BY W. J. BROWN,
Ottawa, Ont.

(continued from page 19)

8. **Aegialia criddlei** n. sp

Length 3.6 - 4.3 mm.; width 1.8 - 2.2. mm. Body moderately convex. Brown or blackish, the legs and sometimes the venter paler; shining.

Front rather coarsely, closely punctate, clypeus granulate, the granules fine and moderately close.

Pronotum widest slightly behind the middle; the side margins feebly arcuate, distinctly crenate; basal margin arcuate, feebly but distinctly sinuate near the hind angles, distinctly crenate except at middle. Disk with one or two small foveae on each side near the middle of lateral declivity; very feebly flattened at the anterior angles; coarsely punctate; the punctures close throughout, dense near the anterior angles.

Elytra slightly wider than the pronotum, the sides very feebly arcuate in basal half; humeri prominent. Disk with coarse, moderately impressed striae; the striae with coarse, very close punctures; intervals feebly convex, with a few very fine punctures; the two most external intervals and elytral apices alutaceous, subopaque.

Metasternum without distinct punctures, the sides narrowly alutaceous, with a small but very distinct tumidity on each side of the median line before the hind coxae. Abdomen alutaceous, less distinctly so at middle, with a few punctures on the sides. Anterior tibia wide; the teeth rather slender, well separated, very acute. Middle and hind femora without distinct punctures. Hind tibia with strong transverse ridges on the outer side, the tibial spurs very slender, parallel, very sharply pointed.

Male. Last abdominal segment broadly concave at middle. Teeth of anterior tibiae very slightly more acute.

Holotype.— ♂, Aweme, Man., June 4, 1927, (N. Criddle); No. 3084 in the Canadian National Collection, Ottawa.

Allotype.— ♀, same data.

Paratypes.—3 ♂, 4 ♀, same data as holotype; 2 ♂, Eastern Ontario; 3 ♂, 3 ♀, Aweme, Man., May 14 and 21, 1904, May 12 and 23, 1923, July 2, 1916, and Sept. 6, 1917, (N. Criddle); 1 ♂, Birtle, Man., May 17, 1928, (R. D. Bird); 1 ♀, Husavick, Man., July 3, 1917, (L. A. Roberts); 6 ♂, 14 ♀ Saskatoon, Sask., May 2, 1927, May 12, 1926, May 22, 1928, June 1 and 30, 1927, July 4, 1928, July 21, 1927, Aug. 15, 1928, Sept. 22, 1927, Sept. 24, 1926, and Oct. 19, 1925, (K. M. King); 1 ♀, Kannanaskis, Alta., June 23, 1925, (O. Bryant); 1 ♂, Queen Charlotte Islands, (J. H. Keen).

On account of the punctate elytral intervals, this species has been confused with *cylindrica*. In *criddlei*, the hind tibial spurs are more slender and the pronotum less closely punctate than in the allied species. The anterior tibia of the female of the present species is quite similar in form to the male tibiae of *lacustris* and *cylindrica* except that the inner margin of the apical tooth is very slightly more rounded in the former.

9. **Aegialia cylindrica** Esch.

Psammodius cylindricus Eschscholtz, Entomogr. I, 11, 1822.
Oxyomus cylindricus Mannerheim, Bull. Soc. Nat. Mosc., XVI, (2), 262, 1843.
Aegialia cylindrica Mannerheim, Bull. Soc. Nat. Mosc., XXVI, (3), 220, 1853; Horn, Trans. Am. Ent. Soc., III, 293, 1871; Le Conte, Proc. Am. Phil. Soc., XVII, 610, 1878; Horn, Trans. Am. Ent. Soc., XIV, 99 and 100, 1887.

Length 3.4 - 4.6 mm.; width 1.7 - 2.1 mm. Body moderately convex. Very dark brown, the legs and sometimes the venter paler; shining.

Front densely, rather coarsely punctate; clypeus finely and closely granulate.

Pronotum with the side margins subparallel in basal two-thirds, feebly arcuate anteriorly, distinctly crenate; basal margin arcuate, at most very feebly sinuate near the hind angles, distinctly crenate except at middle. Disk with a distinct fovea on each side near the middle of the lateral declivity, feebly but distinctly flattened at the anterior angles, the median line usually broadly and very feebly impressed on basal third; coarsely punctate, the punctures very close throughout, dense near the side margins.

Elytra slightly wider than the pronotum, the sides very feebly arcuate in basal half; humeri not prominent. Disk with rather coarse, moderately impressed striae;; the striae with very close, very coarse punctures, these as coarse as the pronotal punctures; intervals feebly convex, very finely and sparsely but distinctly punctate, the most external intervals feebly alutaceous.

Metasternum without punctures, the sides alutaceous, very feebly tumid on each side of the median line before the hind coxae. Abdomen without sculpture at middle, the sides alutaceous and with a few punctures. Anterior tibia wide; the teeth rather slender, well separated, with rounded apices. Middle and hind femora apparently impunctate, with a few microscopic punctures. Hind tibiae with strong transverse ridges on the outer side, the tibial spurs slender, subparallel, sharply pointed.

Male. Last ventral segment broadly concave at midlle. Apical tooth of the anterior tibia narrower and with the inner margin less broadly rounded.

This species was described from Unalaska. The specimens in the collection at hand agree with a specimen in the LeConte collection which was taken at Sitka and evidently sent to LeConte by Mannerheim, as LeConte has written Mannerheim's name on the label. They also agree with an unlabeled specimen and a specimen from Washington Territory in the Horn collection. The National Collection series consists of nine males and eleven females from Edmonton, Alta., British Columbia, Queen Charlotte Islands, and Ft. Wrangel, Alaska.

The species is closely allied to *lacustris* and *criddlei*. It differs from both by numerous slight differences in sculpture but is readily known only by the characters given in the table. The anterior tibiae are exactly like those of *lacustris* and *opaca*.

10. **Aegialia lacustris** Lec.

Aegialia lacustris LeConte, Agass. Lake Superior, 225, 1850; Horn, Trans. Am. Ent. Soc., III, 293, 1871; Horn, l. c. XIV, 99 and 101, 1887.

Length 3.7 - 5.3 mm.; width 1.8 - 2.4 mm. Body moderately convex. Very dark brown or reddish brown, the legs usually and the venter sometimes paler; shining.

Front rather coarsely, closely punctate; clypeus finely and closely granulate.

Pronotum widest slightly behind the middle; the side margins rather feebly arcuate, distinctly crenate; basal margin arcuate, slightly oblique near the hind angles, distinctly crenate except at middle. Disk with a small fovea on each side near the middle of lateral declivity, feebly flattened at the anterior angles; coarsely punctate, the punctures close throughout, usually closer on the sides.

Elytra slightly wider than the pronotum; the sides in basal half not arcuate, feebly diverging from base to middle; humeri prominent. Disk with fine, moderately impressed striae; the striae closely punctate, the punctures as coarse as those of the pronotum; intervals feebly convex, apparently impunctate but with a few microscopic punctules; the most external interval very feebly or not at all alutaceous.

Metasternum without distinct punctures, the sides alutaceous; very feebly tumid on each side of median line in front of the hind coxae. Abdomen at middle with a few indistinct punctules, on the sides alutaceous and with a few punctures. Anterior tibiae moderately wide; the teeth well separated, not notably stout or slender, with rounded apices. Middle and hind femora with a few microscopic punctules. Hind tibia with strong transverse ridges on the outer side; the tibial spurs rather slender, subparallel, sharply pointed.

Male. Last ventral segment broadly concave or flattened at middle. Apical tooth of anterior tibia narrower and with the inner margin less broadly rounded.

The species was described from Lake Superior. In the collection at hand, it is represented by a large number of specimens from the Magdalen Islands, Natashkwan and Kazubazua, Que., Minaki, Ont., many localities in Manitoba, Banff, Calgary, and High River, Alta., Terrace and Merritt, B. C., Paris, Me., Colorado, and Soda Springs, Wash.

The species is readily recognized only by the characters given in the table. The hind tibial spurs are wider than in any other species of the subgenus, *cylindrica* approaching the present species most closely in this character. The anterior tibiae agree perfectly with those of *opaca* and *lacustris*.

IV. **Aegialia** in sens. strict.

Body oblong, usually distinctly wider behind, moderately to strongly robust and convex. Terminal segment of maxillary palpus cylindrical. Clypeus with well defined, rounded granules; front impunctate or virtually so, usually granulate; genae variable.

Pronotum rather short, with the margins not crenate; the apical angles not produced, rectangular; basal angles distinct but very broadly rounded; base never sinuate or oblique near the hind angles, with or without a marginal line;

disk impunctate or virtually so near the hind angles. Elytral intervals virtually impunctate; the humeri rounded, never prominent.

Anterior tibiae moderately wide; the teeth well separated, with rounded apices; the middle and apical teeth elongate. Hind legs slender or stout; the tibiae with transverse ridges on their outer margins; the tibial spurs varying from moderately slender to foliaceous but always narrowed at the base; the tarsi varying from moderately long to short.

Sexual characters not apparent.

This group is closely allied to *Psammoporus*. It is characterized primarily by the type of sculpture; the tendency, usually distinct, for the body to be wider behind; the form of the anterior tibiae; and the lack of apparent sexual characters. The accompanying figure of the anterior tibia of *blanchardi* illustrates the form of this organ in the present subgenus. In some species, the last ventral segment is flattened or depressed at middle; this, however, seems to have no sexual significance.

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1. Pronotum with basal marginal line strong and entire 2
   Pronotum with basal marginal line very feeble, always broadly interrupted and indistinct, sometimes wholly absent 5
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   Hind tibial spurs foliaceous 3
3. Color pale to medium reddish brown; length 3.6 to 4.2 mm.; pronotum finely and sparsely punctate ..... 12. *conferta conferta* Horn
   Color dark brown or blackish 4
4. Pronotum finely and sparsely punctate; length 3.4 to 3.6 mm. ..... 12a. *conferta nigrella* n. subsp.
   Pronotum with more strongly impressed, rather coarse punctures; length 3.6 to 4.2 mm. ..... 12b. *conferta punctata* n. subsp.
5. Hind tibial spurs foliaceous, the inner not twice as long as wide; length 3. to 3.7 mm. ..... 13. *opifex* Horn
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6. Pronotum very distinctly punctate at middle 7
   Pronotum almost impunctate, with a few very fine, indistinct punctures at middle ..... 16. *arenaria* Fab.
7. Pronotum coarsely punctate throughout except on the area at the hind angles; genae prominent ..... 14. *latispina* Lec.
   Pronotum not coarsely punctate near the anterior margin and on the sides; genae not prominent 8
8. Pronotal punctures coarse in basal half, fine and often indistinct apically and on the sides ..... 15. *crassa crassa* Lec.
   Pronotal punctures fine in basal half, the lateral and apical areas impunctate ..... 15. *crassa insularis* Brown

11. Aegialia blanchardi Horn

Aegialia blanchardi Horn, Trans. Am. Ent. Soc., XIV, 99 and 102, 1887.

Length 4.5 mm. width 1.8 - 2.3 mm. Oblong oval, very slightly broader

behind, moderately robust and convex. Blackish, the legs dark brown, strongly shining.

Head seven-tenths as wide as pronotum; clypeus and apical portion of front finely and closely granulate; posterior part of front smooth or somewhat subgranulate, sometimes with a few very fine and indistinct punctures, never distinctly punctate; genae not prominent, their margins almost continuous with those of the clypeus.

Pronotum seven-tenths as long as wide, widest behind the middle, the sides feebly arcuate; basal margin arcuate, the marginal line entire. Disk with a small fovea on each side near middle of lateral declivity, flattened at the front angles, the median line feebly impressed at base; finely and sparsely punctate; the punctures becoming much sparser, finer, and indistinct on lateral declivities and near anterior margin.

Elytra slightly wider than the pronotum, the sides scarcely arcuate in basal half; disk with fine, moderately impressed striae; the striae finely, rather closely punctate; intervals feebly convex, with a few indistinct, microscopic punctules.

Mesosternum without distinct punctures, alutaceous on the sides. Abdomen alutaceous, with a few punctures. Middle and hind femora microscopically punctulate. Middle and hind tibiae slender, the latter slightly more than three times as long as wide, with a very feeble transverse ridge at apical third; hind tibial spurs rather slender, subparallel, sharply pointed; hind tarsus about three-fourths as long as the tibia.

The species was described from Lowell, Mass. and North Carolina. The above description is drawn from twenty-four specimens from the type localities, Tyngsboro, Mass., Vancouver and Mission, B. C., and Olympia, Wash. Dr. Van Dyke has recorded the species from Puyallup, Wash., Newport; Ore., and Del Norte Co., Cal.

A careful study of this material has failed to discover any character which will distinguish eastern from western examples.

12. **Aegialia conferta conferta** Horn

Aegialia conferta Horn, Trans. Am. Ent. Soc., III, 293 and 294, 1871; Horn, l. c. XIV, 99 and 103, 1887; Wickham, Can. Ent. XXVI, 202, 1894; Blatchley, Col. Ind. 921, 1910.

Length 3.8 - 4.5 mm.; width 1.8 - 2.2 mm. Oblong, distinctly broader behind, moderately convex, robust. Pale to medium reddish brown, shining.

Head seven-tenths as wide as the pronotum, finely and closely granulate, genae not prominent, their margins almost continuous with the sides of the clypeus.

Pronotum three-fifths as long as wide, widest just behind the middle; the sides moderately arcuate; basal margin arcuate, the marginal line strong and entire. Disk with a very distinct fovea on each side near middle of lateral declivity, flattened at the front angles; at middle slightly irregular but without granules or rugae, finely and sparsely, not at all strongly punctate; the punctures on the lateral declivities finer, sparser, and very indistinct.

Elytra distinctly wider than the pronotum, the sides straight and diverging apically in basal two-thirds; disk finely striate; the strial punctures close, moderately coarse; intervals almost flat, impunctate.

Metasternum without sculpture at middle; the sides broadly alutaceous, feebly punctate. Abdomen alutaceous except at middle, with a few rather coarse punctures, the last two segments rather closely punctate throughout; the last segment convex, without impressions. Middle and hind femora with a few coarse punctures near the margins. Middle tibiae rather slender. Hind tibia stout, two and one-half times as long as wide, with a feeble transverse ridge at apical third; the spurs foliaceous, the inner not twice as long as wide; the hind tarsus two-thirds as long as the tibia.

The species was described from the Middle and Southern States and Illinois. The above description is based on fifteen specimens from Prince Edward Co., Ont., Husavick, Man., Merritt, B. C., Chicago, Ill., Mandan, N. D., and Silver City, N. M.

12a. **Aegialia conferta nigrella** n. subsp.

Length 3.4 - 3.6 mm.; width 1.7 - 1.8 mm. Blackish, the legs dark brown Other characters as in typical *conferta*.

Holotype—Trinity Co., Cal., October 10, 1918, (E. R. Leach); No. 3085 in the Canadian National Collection, Ottawa.

Paratypes—3, same data.

12b. **Aegialia conferta punctata** n. subsp.

Length 3.6 - 4.2 mm.; width 1.7 - 2.1 mm. Dark reddish brown or blackish. Pronotum except on the lateral declivities strongly, rather coarsely, rather sparsely punctate. Other characters as in typical *conferta*.

Holotype—Kaweah, Tulare Co., Cal., April 10, 1907, (R. Hopping); No. 3086 in the Canadian National Collection, Ottawa.

Paratypes—8, same data; 6, Los Angeles, Cal.; 2, Pasadena, Cal., (A. Fenyes); 1, Del Monte Cal., Feb. 18, 1923, (L. S. Slevin).

13. **Aegialia opifex** Horn

Aegialia opifex Horn, Trans. Am. Ent. Soc. XIV, 99 and 104, 1887.

Length 3 - 3.7 mm.; 1.6 - 1.9 mm. Oblong, distinctly broader behind, moderately convex, robust. Very dark brown or blackish, the legs paler, strongly shining.

Head two-thirds as wide as the pronotum, finely and closely granulate; genae not prominent, their margins not quite continuous with those of the clypeus.

Pronotum three-fifths as long as wide, widest just behind the middle; the sides moderately arcuate, not crenate; basal margin feebly sinuate each side of middle, the marginal line evident only near the hind angles. Disk with a very distinct fovea on each side near middle of lateral declivity, flattened at the front angles, the median line usually feebly impressed near base; finely, not closely punctate, the punctures very fine, sparse, and indistinct on the lateral declivities.

Elytra distinctly wider than the pronotum, the sides feebly arcuate in basal two-thirds; disk finely striate; the striae rather coarsely and closely punctate; intervals feebly convex, impunctate.

Metasternum without sculpture at middle; the sides broadly alutaceous. punctate. Abdomen alutaceous except at middle, with a few coarse punctures; the last segment usually somewhat flattened or broadly and feebly impressed at

middle. Middle and hind femora with a few coarse punctures near the margins. Middle tibiae slender. Hind tibia slender, three times as long as wide, with a strong transverse ridge at apical third; the spurs foliaceous, the inner not twice as long as wide; the hind tarsus three-fifths as long as the tibia.

This is our smallest species of the genus. It was described from Lowell, Mass., and is represented in our collection by twenty-four specimens from Lawrencetown, N. S., Kazubazua, Que., Rumney, N. H., and Ipswich, Mass.

14. **Aegialia latispina** Lec.

Aegialia latispina LeConte, Proc. Am. Phil. Soc. XVII, 610 and 611, 1878; Horn, Trans. Am. Ent. Soc. XIV, 99 and 103, 1887.

Length 3.6 - 4.4 mm.; width 1.9 - 2.2 mm. Oblong oval, very slightly broader behind, moderately convex, robust. Brown or blackish, the legs paler, shining.

Head two-thirds as wide as the pronotum, finely and closely granulate; genae prominent, their margins not at all continuous with those of the clypeus.

Pronotum seven-tenths as long as wide, widest behind the middle; the sides moderately arcuate; basal margin feebly sinuate each side of middle; the basal marginal line very fine, evident only at middle and near the hind angles. Disk with a very small, indistinct fovea on each side near middle of lateral declivity, flattened at the front angles, coarsely punctate; the punctures rather sparse at middle, closer on the sides.

Elytra slightly wider than the pronotum, the sides very feebly arcuate in basal two-thirds; disk finely striate; the striae with moderately coarse and close punctures; intervals feebly convex, apparently impunctate but with a few microscopic punctures.

Metasternum without sculpture at middle; the sides broadly alutaceous, indistinctly punctate. Abdomen alutaceous, indistinctly so at middle, with a few coarse punctures; the last segment with a more or less distinct transverse impression near the front margin. Middle and hind femora with a few coarse punctures near the margins. Middle tibia rather stout. Hind tibiae slender, three times as long as wide, with a strong transverse ridge at apical third; the spurs elongate oval, the inner more than twice as long as wide; the hind tarsi two-thirds as long as the tibia.

The species was described from California. The above description is based on eight specimens from Tulare Co. and Sierra Nevadas, Cal., and Prescott, Ariz. Dr. Van Dyke records it from Siskiyou to Los Angeles Co., Cal. It differs from all other species by the pronotal puncturation and the prominent genae.

15. **Aegialia crassa crassa** Lec.

Aegialia crassa LeConte, Rept. of Exp. and Surv. Miss. to Pac., App. 1, 42, 1857; Horn, Trans. Am. Ent. Soc. III, 293 and 294, 1871; Horn, l. c. XIV, 100 and 104, 1887.

Length 3.9 - 4.8 mm.; width 2 - 2.7 mm. Oblong, slightly broader behind, strongly convex. Dark brown or blackish, strongly shining.

Head two-thirds as wide as the pronotum, finely and closely granulate; genae not prominent, their side margins continuous with those of the clypeus.

Pronotum three-fifths as long as wide, widest just behind the middle; the sides moderately arcuate; basal margin arcuate, without an impressed marginal line except near the hind angles. Disk with a small, indistinct fovea on each side near middle of lateral declivity, slightly flattened near the anterior

angles; sparsely punctured; the punctures coarse in basal half, very fine and often indistinct apically and on the lateral declivities.

Elytra distinctly wider than the pronotum, the sides very feebly arcuate in basal half; disk with fine, feebly impressed striae; the striae with fine, distant, very indistinct punctures; intervals flat, impunctate.

Metasternum smooth at middle, alutaceous and with a few punctures on the sides. Abdomen alutaceous, indistinctly so at middle, punctate; the last segment with a large, shallow, transverse impression near front margin. Middle and hind femora with a few coarse punctures near the margins. Middle tibiae stout. Hind tibia stout, two and one-half times as long as wide, with a strong transverse ridge at apical third; the spurs elongate oval, the inner more than twice as long as wide; the hind tarsus two-thirds as long as the tibia.

The species was described from San Francisco, Cal. It is represented in the National Collection by nineteen specimens from the type locality, Alameda Co. Cal., and Waldport, Ore. According to Dr. Van Dyke, it occurs from northern Oregon to Carmel, Cal.

15a. **Aegialia crassa insularis** Brown

Aegialia crassa insularis Brown, Can. Ent. LXI, 87, 1929.

Pronotal punctures fine, not strongly impressed, confined to basal half; apical half and lateral declivities of pronotum impunctate. Other characters as in typical *crassa*.

This subspecies is known only from the type series of nine specimens from the Queen Charlotte Islands.

16. **Aegialia arenaria** Fab..

Scarabaeus arenarius Fabricius, Mant. Ins. I, 11, 1787.
Scarabaeus globosus Kugelann, Schneid. Mag. I, 514, 1794.
Aegialia arenaria Darlington, Psyche XXXIV, 98, 1927.

Length 4.3 - 5.3 mm.; width 2.4 - 2.9 mm. Oblong, broader behind, strongly convex, very robust. Dark brown or blackish, strongly shining.

Head seven-tenths as wide as the pronotum, finely and closely granulate; genae slightly prominent, their side margins not quite continuous with those of the clypeus.

Pronotum two-thirds as long as wide, widest just behind the middle, the sides moderately arcuate; basal margin arcuate, without a marginal line. Disk not foveate, not flattened near the anterior angles; apparently impunctate but with a few microscopic punctures at middle.

Elytra considerably wider than the pronotum, the sides moderately arcuate in basal half; disk with fine, feebly impressed striae; the striae with fine, distant, very indistinct punctures; intervals flat, impunctate.

Metasternum smooth at middle, alutaceous and punctate on the sides. Abdomen alutaceous, feebly so at middle, punctate; the last segment convex, without impressions. Middle and hind femora with a few coarse punctures near the margins. Middle tibiae stout. Hind tibiae stout, two and one-half times as long as wide, with a strong transverse ridge at apical third; the spurs elongate oval; hind tarsus half as long as the tibia.

The species has been collected on this continent only at Ipswich, Mass. It is widely distributed in Europe. It is the most robust of our species and is very closely allied to *crassa* from which it is separated readily only by the characters given in the table.

NOTE ON THE LARVAE OF METREA OSTREONALIS (PYRAUSTINAE, LEPID.)*

BY J. MCDUNNOUGH,
Ottawa, Ont.

In the latter part of July 1929 I found several unknown Pyralid larvae tying up the leaves of a shrub of *Rhamnus frangula* Linn. (indentification by Dr. M. O. Malte, Botanist in the Victoria Museum, Ottawa) in the vicinity of Fulford, Que. The web formed was an untidy sort of affair mixed with dead leaves and excrement, and each web contained only a single larva. When full grown this larva resembles considerably the well-known one of the *Asclepias*-feeder, *Pyrausta futilalis* Led.; the head and prothoracic shield are grey-blue, sprinkled and dotted with black; the abdomen is dorsally grey-blue with a geminate orange dorsal line and a single orange spiracular stripe; tubercles large, black; ventrally paler grey-blue. At the end of the feeding period the caterpillar spins a coarse yellowish cocoon, mixed with debris and leaves, and passes the winter in this, pupating in early spring. The moth emerges a couple of weeks later.

Only a single one of my larvae was successfully brought to the adult state, the species proving to be *Metrea ostreonalis* Grt., a rather rare Pyraustid, only represented in our collections by a couple of Ottawa specimens, and concerning the life-history of which nothing, to my knowledge, has heretofore been published. It is rather peculiar that the caterpillar should be found on an introduced European shrub and it is quite possible that the species has a native food-plant, not yet discovered.

ENTOMOLOGICAL SOCIETY OF ONTARIO

At the annual meeting of the Entomological Society of Ontario, held in November last, the Nominating Committee recommended for election as Directors of the Society, the Reverend Father Leopold and Mr. T. D. Jarvis. It was learned subsequently, that the above gentlemen should not have been nominated for these positions, in view of the fact that they are past presidents of the Society and are, therefore, on the Board of Directors. The Nominating Committee, therefore, have recommended that the names of Mr. A. B. Baird, Belleville, Ont., and Mr. C. E. Petch, Hemmingford, be substituted for the above. L. S. McLaine.

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*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

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